Notice of Allowability	**Application No.** 10/532,912	**Applicant(s)** MONTALBANO, GIUSEPPE	
	Examiner KABIR A. TIMORY	**Art Unit** 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *01/26/2011*.
2. ☒ The allowed claim(s) is/are *1-13, 15, and 19-21*.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *3/29/2011* .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Kabir A Timory/
Examiner, Art Unit 2611

DETAILED ACTION

1. Acknowledgement is made of the amendment received on 01/26/2011.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephonic interview with Peter J. Meza on March 29, 2011.

The claims in the application have been amended as follows:

In claims:

(1) Replace claim 1 with:

A method for estimating a first and second propagation channel being modelled as a linear superposition of finite number of discrete multipath components following an uncorrelated-scattering wide-sense stationary model, with a receiver, comprising the steps of:

accounting for a structure of the first and second propagation channels, wherein the first propagation channel is associated with a common pilot channel and the second

propagation channel is associated with a dedicated physical channel, wherein the first propagation channel is transmitted without any beam forming and the second propagation is subject to transmit beam forming, wherein the first and second propagation channels are based on a common structure of corresponding propagation channels, one of the channels comprising two sub-channels including a dedicated physical data channel and a dedicated physical control channel (DPDCH, DPCCH);

providing channel estimation of the first propagation channel based on pilots used for computing time varying multipath coefficient c_p(t) and delay τ_p representative of the common pilot channel;

providing channel estimation of the second propagation channel, wherein the time varying multipath complex coefficient c_p(t) and the delay τ_p used in the estimation of the first propagation channel are utilized in the channel estimation of the second propagation channel and at least a complex coefficient $\beta_p c_p(t)$ where β_p comprises a beamforming complex factor.

(2) Replace claim 2 with:

The method of claim 1, wherein said second propagation channel corresponds to a first sub-channel (DPDCH), and

wherein the providing step further comprises providing estimates of each multipath component (p=1,...,P) complex coefficient ($\beta_p c_p(t)$) according to a maximum-a-posteriori (MAP) optimization criterion accounting for the whole available information, comprising the steps of:

building a second channel comprising a dedicated physical channel (DPCH) and a first channel comprising a common pilot channel (CPICH) having instantaneous maximum likelihood (ML) channel multipath complex coefficients estimates ($\hat{c}_{dpch}(n)$, and $\hat{c}_{pich}(n)$);

performing interpolation of the above obtained ML instantaneous second (DPCH) and first (CPICH) channel multipath complex coefficient estimates ($\hat{c}_{dpch}(n)$, and $\hat{c}_{pich}(n)$) to a lowest symbol rate of said second (DPCH) and first (CPICH) logical channels;

computing an optimal linear prediction filter (f) according to a joint second and first channels (DPCH-CPICH) maximum-a-posteriori (MAP) criterion;

filtering the interpolated ML instantaneous second (DPCH) and first (CPICH) channel multipath complex coefficient estimates obtained at the performing interpolation step with said optimal linear prediction filter in order to obtain a MAP first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{\mathrm{dpch-MAP}}(k)$); and

interpolating said MAP first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{\mathrm{dpch-MAP}}(k)$) to the second logical channel (DPCH) symbol rate when said symbol rate is lower than the first logical channel (CPICH) symbol rate.

(3) Replace claim 3 with:

A method for estimating a propagation channel in a presence of transmit beamforming characterized in that said propagation channel corresponds to a first sub-channel comprising a dedicated physical data channel (DPDCH) and that said method provides estimates of each multipath component (p=l..., P) complex coefficient,

accounting for the whole available information associated with two logical channels including a common pilot channel and a dedicated physical channel (CPICH, DPCH) and corresponding propagation channels with a receiver, comprising the steps of:

building a second channel comprising (DPCH) and a first channel comprising (CPICH) having instantaneous maximum likelihood (ML) channel multipath coefficients estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{pich}(n)$);

performing interpolation of said ML instantaneous first (DPCH) and second (CPICH) channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$ and $\hat{c}_{cpich}(n)$) to the lowest symbol rate of said second (DPCH) and first (CPICH) logical channels;

building an optimal maximum a posteriori estimate ($\tilde{c}_{cpich-MAP}(k)$)of the first (CPICH) channel multipath coefficient $(\tilde{c}_{cpich}(k))$;

building an estimate of a cross-correlation ($\hat{\phi}_{dc}(l)$) between the first (CPICH) and second (DPCH) channel multipath coefficient instantaneous maximum likelihood estimates obtained at step 2 ($\hat{c}_{dpch}$ and $\hat{c}_{pich}$) and an estimate of an autocorrelation ($\hat{\phi}_{dc}(l)$) between the (CPICH) channel multipath coefficient instantaneous maximum likelihood estimates ($\hat{c}_{pich}$) of step 1 and 2 at non-zerocorrelation lag ($l \neq o$) for noise suppression;

building an estimate ($\hat{\beta}$) of a beamforming complex factor (β) of said correlation and autocorrelation estimates;

building a first sub-channel including a dedicated physical data channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{cpich}(k)$) as a product of the estimates obtained at building an optimal step ($\tilde{c}_{cpich-MAP}(k)$) and building an estimate step ($\hat{\beta}$), and

interpolating said first sub-channel (DPDCH) multipath coefficient estimate ($\hat{c}_{cpich}(k)$) to the second logical channel (DPCH) symbol rate when said symbol rate is lower than the first logical channel (CPICH) symbol rate.

(4) Replace claim 4 with:

The method of claim 2, wherein the first logical channel (CPICH) maximum likelihood channel multipath coefficient estimates ($\hat{c}_{pich}(n)$) are computed based on the a-priori knowledge of some pilot symbols forming said first logical channel (CPICH).

(5) Replace claim 5 with:

The method of claim 2, wherein the second logical channel (DPCH) maximum likelihood channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$), related to the second sub-channel (DPCCH), are computed based on the a-priori knowledge of the pilot symbols forming said second sub-channel (DPCCH).

(6) Replace claim 6 with:

The method of claim 2, wherein the second logical channel (DPCH) maximum likelihood channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$) related to the first sub-channel (DPDCH) are computed by a decision-direct mechanism.

(7) Replace claim 7 with:

The method of claim 2, wherein the interpolation of step is performed by nearest neighbour interpolation.

(8) Replace claim 13 with:

The method as claimed in claim 10, wherein the estimate of said complex factor (β) is limited to the lag equal to 1.

(9) Cancel claim 14:

(10) Replace claim 15 with:

An apparatus for estimating a propagation channel in a presence of transmit beamforming by accounting for a structure of two logical channels referred to as a common channel and a dedicated physical channel (CPICH, DPCH), and based on a common structure of corresponding propagation channels, said dedicated physical channel (DPCH) comprising two sub-channels (DPDCH, DPCCH), comprising:

a receiver providing channel estimation in a multipath environment to acquire a beamforming complex factor by modelling said propagation channels as a linear superposition of a finite number (p=1,. ., P) of discrete multipath components following an uncorrelated scattering wide-sense stationary model, and wherein a multipath component is characterized by a time-varying multipath complex coefficient ($c_p(t)$ and, $\beta_p c_p$, (t)) and a delay (τ_p);

means for building a second logical channel comprising a (DPCH) channel and a first logical channel comprising a (CPICH) channel for corresponding propagation channel instantaneous maximum likelihood ML channel multipath coefficient estimates $(\hat{c}_{dpch}(n)$ and $(\hat{c}_{cpich}(n))$;

means for performing interpolation of the above obtained (ML) instantaneous second (DPCH) and first (CPICH) logical channel corresponding propagation channel multipath coefficient estimates $(\hat{c}_{dpch}(n))$ and $(\hat{c}_{cpich}(n))$ to a lowest symbol rate of said second (DPCH) and first (CPICH) logical channels;

means for building an optimal linear prediction filter according to a joint second and first (DPCH-CPICH) channel maximum-a-posteriori criterion;

means for building a first sub-channel (DPDCH) multipath coefficient estimate $(\tilde{c}_{dpch-MAP}(k))$ by filtering with said optimal linear prediction filter with said interpolated ML instantaneous second (DPCH) and first (CPICH) logical channel corresponding propagation channel multipath coefficient estimates $(\hat{c}_{dpch}(n))$ and $(\hat{c}_{cpich}(n))$; and

means for interpolating said first sub-channel (DPDCH) multipath coefficient estimate $(\tilde{c}_{dpch-MAP}(k))$ to the second logical channel (DPCH) symbol rate when said symbol rate is lower than the first logical channel (CPICH) symbol rate.

Allowable Subject Matter

3. Claims 1-13, 15, and 19-21 are allowed.

4. The following is a statement of reasons for allowable subject matter:

The prior art of record, Nilsson et al. does not teach or suggest wherein the first propagation channel is associated with a common pilot channel and the second propagation channel is associated with a dedicated physical channel, wherein the first propagation channel is transmitted without any beam forming and the second propagation is subject to transmit beam forming, wherein the first and second propagation channels are based on a common structure of corresponding propagation channels, one of the channels comprising two sub-channels (DPDCH, DPCCH); providing channel estimation of the first propagation channel based on pilots used for computing time varying multipath coefficient Cp(t) and delay *Tp* representative of the common pilot channel; providing channel estimation of the second propagation channel, wherein the time varying multipath complex coefficient Cp(t) and the delay *Tp* used in the estimation of the first propagation channel are utilized in the channel estimation of the second propagation channel and at least a complex coefficient B*pCp(t)* where Bp being the beam forming complex factor.

The prior art of record, Nilsson et al. also does not teach or suggest

means for building a second logical channel comprising a (DPCH) channel and a first logical channel comprising a (CPICH) channel for corresponding propagation channel instantaneous maximum likelihood ML channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$ and ($\hat{c}_{cpich}(n)$);

means for performing interpolation of the above obtained (ML) instantaneous second (DPCH) and first (CPICH) logical channel corresponding propagation channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$) and ($\hat{c}_{cpich}(n)$) to a lowest symbol rate of said second (DPCH) and first (CPICH) logical channels;

means for building an optimal linear prediction filter according to a joint second and first (DPCH-CPICH) channel maximum-a-posteriori criterion;

means for building a first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{dpch-MAP}(k)$) by filtering with said optimal linear prediction filter with said interpolated ML instantaneous second (DPCH) and first (CPICH) logical channel corresponding propagation channel multipath coefficient estimates ($\hat{c}_{dpch}(n)$) and ($\hat{c}_{cpich}(n)$); and

means for interpolating said first sub-channel (DPDCH) multipath coefficient estimate ($\tilde{c}_{dpch-MAP}(k)$) to the second logical channel (DPCH) symbol rate when said symbol rate is lower than the first logical channel (CPICH) symbol rate.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kabir A. Timory whose telephone number is 571-270-1674. The examiner can normally be reached on 6:30 AM - 3:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kabir A Timory/

Examiner, Art Unit 2611